

HAWAIIAN CLIMATOLOGICAL DATA FOR JUNE, 1901.

By CURTIS J. LYONS, Territorial Meteorologist.

Rainfall data for the Hawaiian Service.

Stations.	June, 1901.	Stations.	June, 1901.
HAWAII.		MAUI—Continued.	
HILO, e. and ne.	<i>Inches.</i>	<i>Inches.</i>	
Waialea	3.45	Nahiku, ne	5.00
Hilo (town)	2.30	Haiku, n	2.28
Kaunama	3.76	Kula (Erehwon), n	
Pepeekeo	2.85	Puomalei, n	1.35
Hakalau	2.99	Pala, n	
Honohina	3.78	Haleakala Ranch, n	
Laupahoehoe		LANAI.	
Ookala	0.57	Keomuku, e	0.00
HAMAKUA, ne		OAHU.	
Kukuihale	0.53	Punahou (Weather Bureau), sw	1.43
Paauilo	0.25	Kulaokahua, sw	0.98
Paauhau (Moore, Gibb)	0.10	Kewalo (King street), sw	1.34
Paauhau (Greig)		United States Naval Station, sw	0.72
Honokaa (Muir)	0.41	Kapiolani Park, sw	
Honokaa (Rickard)		Makiki Reservoir	1.49
Kukuihale	0.68	Manoa (Woodlawn Dairy), c	3.41
KOHALA, n.		School Street (Bishop), sw	1.79
Awini Ranch		Insane Asylum, sw	1.57
Niuli	0.65	Nuananu (W. W. Hall), sw	1.74
Kohala (Mission)	1.03	Nuananu (Wylie Street), sw	
Kohala (Sugar Co.)	1.04	Nuananu (Elec. Station), sw	4.81
Waimea	0.51	Nuananu (Luakaha) c	8.59
Hawi	1.15	Waimanalo, ne	1.57
KONA, W.		Maunawili, ne	2.59
Kailua	8.49	Kaneohe, ne	2.48
Kealahou	6.10	Ahulimanu, ne	4.95
KAU, se.		Kahuku, n	1.40
Naalehu	1.21	Waialua, n	0.82
Honuapo	0.49	Ewa Plantation, s	0.39
Hilea	0.30	Waipahu, s	0.42
Pahala	1.01	Pacific Heights, sw	3.57
Moaula	1.79	Wahiawa, c	2.97
PUNA, e.		Moanalua, sw	0.95
Volcano House	1.70	Kalihi-uka	4.19
Kapoho	3.59	KAUAI.	
Kalapana, se		Lihue (Grove Farm), e	3.19
MAUI.		Lihue (Mokoko), e	2.45
Olowalu		Lihue (Kukaua), e	6.03
Waipae Ranch, s		Kealia, e	2.15
Kaupo (Mokulan), s	5.13	Kilauea, ne	4.23
Kipahulu, s	4.09	Hanalei, n	4.85
Hamos Plantation, se	2.81	Waialea, sw	0.45
Nahiku, ne	6.23	Elele, s	4.20
		Waialea, Mountain, s	15.65

Records not hitherto published, May, 1901.

Kailua	6.81	Moaula	8.18
Kaunama	5.21	Kohala Sugar Co.	0.19
Awini Ranch	0.03	Hawi	0.92
Nuananu (W. W. Hall)	2.95	Makiki Reservoir	4.43
Electric Light Station	5.51	Kalihi-uka	4.33

NOTE—The letters n. nw. e. sw. se. ne. and s. attached to each name indicate the exposure or direction toward which localities face the sea; "c," central locality.

GENERAL SUMMARY FOR JUNE, 1901.

Approximated percentages of district rainfall as compared with normal: Hilo, 35 per cent; Hamakua, 10; Kohala, 22; Waimea, 27; Kona, 130; Kau, 150; Puna, 80; Maui, uncertain on account of frequent changes in stations, probably 125 on southeast exposures, and 80 on north exposures; Oahu, 100 per cent; Kauai, 100, excepting Hanalei, 75. Northerly exposures suffered, as in May, the sugar crop on the northern portion of the island of Hawaii being particularly affected. At Waimea, Hawaii, the main stream is lower than ever known before, owing to the denudation of Kohala mountain forest destroying the natural reservoirs.

The artesian well level on the 15th of June stood at 32.85 feet above the mean sea level. This is as low as the lowest on record.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, average maximum, 78.6; average minimum, 68.9; Waimea, Hawaii, 2,730 elevation, 77.2 and 65.2; Kohala, 521 elevation, 81.4 and 70.6; Ewa Mill, Oahu, 50 elevation, 86.7 and 69.1; Kulaokahua (W. R. Castle's), 60 feet elevation, highest, 87; lowest, 67; mean, 77.4. The average fall in temperature is 1° F., for each 300 feet of ascent.

The absolute humidity was the highest on record for June,

showing the unusual southerly origin of the atmospheric supply.

Earthquake reported from Kona and Kau on the 8th; not from Hilo. Snow is still visible on summit of Mauna Kea. Kilauea exhibits heat symptoms. Heavy swell 4th and 24th; very smooth sea 6th to 15th. No thunder or lightning.

Meteorological Observations at Honolulu, June, 1901.

The station is at 21° 18' N., 157° 50' W.
Hawaiian standard time is 10^h 30^m slow of Greenwich time. Honolulu local mean time is 10^h 31^m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, -0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m. Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 2:30 a. m. Honolulu time.							Total rainfall at 9 a. m., local time.		
				Temperature.		Moisture.		Wind.		Average cloudiness.		Sea-level pressures.	
				Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.			Prevailing direction.	Force.	Maximum.	Minimum.
1.....	29.95	75	68.5	68	68	67.5	78	se.	1-0	3	30.00	29.98	0.00
2.....	29.98	75	68.5	68	68	66.5	71	ne.	1	3	30.05	29.96	0.06
3.....	29.99	76	67.5	63	70	65.5	67	ne.	3	4-5	30.08	29.96	0.00
4.....	[29.99]	76	67.5	63	73	64.8	68	ne.	4	3	30.08	29.97	0.00
5.....	29.92	71	67	63	72	63.7	64	ne.	3	3	30.02	29.92	0.00
6.....	29.92	71	69	63	67	65.0	70	ne.	3	1-4	29.96	29.99	0.00
7.....	29.94	73	71.7	63	68	68.0	83	se.	1	5	29.99	29.93	0.04
8.....	29.96	69	68.3	63	72	70.7	83	s-e-n.	1-0	5-10	30.02	29.95	0.06
9.....	29.99	66	61	62	68	70	70	s-n.	1-0	5-10	29.99	29.91	0.00
10.....	29.98	72	71.3	64	70	70.3	76	s-n.	1-0	8	29.94	29.87	0.10
11.....	29.96	73	71.7	63	71	71.0	83	s-n.	1-0	5-1	29.92	29.85	0.01
12.....	29.92	75	73	63	72	71.3	80	s-n.	2-0	7	29.97	29.89	0.01
13.....	29.96	69	67	63	73	71.0	82	s-n.	1-0	6-2	30.02	29.91	0.00
14.....	30.01	74	68	64	69	68.3	76	s-nne.	1-3	4	30.07	29.92	0.00
15.....	30.00	75	68	66	70	66.3	66	ne.	3-1	2	30.04	29.99	0.00
16.....	30.01	76	68.5	65	74	66.7	67	ne.	3-1	2	30.04	29.96	0.04
17.....	30.05	77	69	64	73	65.5	64	ne.	3-4	4-1	30.07	30.00	0.01
18.....	30.06	77	68.5	64	75	65.7	65	ne.	3	4	30.11	30.04	0.00
19.....	30.01	76	70	64	74	65.7	64	ne.	3-5	3	30.09	30.01	0.04
20.....	29.94	76	69	64	75	67.5	73	ne.	4	6-3	30.02	29.96	0.06
21.....	29.93	76	71.5	63	74	67.3	73	ne.	4	6	29.96	29.91	0.15
22.....	30.01	77	71	64	74	68.5	71	ne.	4	3	30.04	29.93	0.00
23.....	30.06	74	69	65	76	67.7	68	ne.	4-5	4	30.09	30.01	0.41
24.....	30.00	76	69	63	72	66.3	69	ne.	3	7-3	30.09	30.01	0.04
25.....	29.95	75	68	64	73	66.7	71	ne.	3	5-2	30.04	29.95	0.06
26.....	29.95	74	68	65	73	65.3	66	ne.	3	2	30.00	29.92	0.00
27.....	29.97	73	70	64	69	66.7	71	ne.	2-3	3-6	30.01	29.94	0.12
28.....	29.98	77	68.5	64	70	68.3	72	ene.	3	6	30.04	29.96	0.02
29.....	29.92	75	68.5	65	75	66.3	68	ne.	4-2	6-3	29.99	29.91	0.08
30.....	29.89	76	69	64	70	66.3	69	ne.	4	3	29.94	29.86	0.04
Sums..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.42
Means.	29.968	74.5	68.8	63.7	71.9	67.4	71.5	.....	2.4	4.2	30.019	29.941	.....
Departure..	-0.086	+2.0	.....	.....	.....	+2.1	+1.0	.....	.....	+0.2	.....	.....	-0.10

Mean temperature for June, 1901 (6+2+9)+3=77.4; normal is 75.9. Mean pressure for June, 1901 (9+3)+2=29.976; normal is 30.012.

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4:31 p. m., Greenwich time. ‡These values are the means of (6+9+2+9)+4. §Beaufort scale.

CLIMATOLOGY OF ST. KITTS. COMPARISON OF BAROMETERS.

By W. H. ALEXANDER, Weather Bureau.

In order to determine as far as possible the real or comparative value of the barometric means given in articles on the Climatology of St. Kitts, and published in the MONTHLY WEATHER REVIEW, Annual Summary for 1899, and in the MONTHLY WEATHER REVIEW for August, 1900, the barometers used in obtaining the original records were secured and exposed in the local office of the United States Weather Bureau beside the station barometer, the cisterns of all three being practically on a level—about 29 feet above sea level. On March 1 a series of readings was commenced and continued through the entire month, each barometer being read seven times per day: at 8 a. m., 9 a. m., 10 a. m., 12 noon, 2 p. m.,

3 p. m., and 4 p. m., local time. These hours were selected for the readings to bring the series into harmony with the old records. The readings of the station barometer were corrected for temperature, instrumental error, and elevation; the readings of the other two were corrected for elevation only by adding .030 inch. The results are given in the accompanying table.¹ For a description of the two old barometers the reader is referred to the article cited above in the August REVIEW.

The means of the 217 readings made during the month are as follows, viz:

	Inches.
United States Weather Bureau No. 274.....	30.014
Hancock-Plageman barometer	29.998
Evelyn barometer.....	29.954

From this it appears that the Evelyn barometer is .060 inches too low, and the Hancock-Plageman barometer .016 inches too low. This difference, however, may be largely due to deterioration of the old instruments, especially in the case of the Evelyn barometer which has now been in use over half a century.

Then again we may compare the means of this series with the corresponding March means given in Table I of the article in the August REVIEW, bearing in mind, however, that the Evelyn observations were not corrected for elevation, while the others were. It will be observed that the means in the accompanying table are invariably lower than Mr. Evelyn's means, the average difference being .032 inch, which would be greater, perhaps .062 inch, if we make allowance for the correction for elevation. In the case of the Hancock record the difference is very slight, only .007 inch on the average. His 9 a. m. mean is .018 inch lower than mine, our 10 a. m. means are exactly the same, while my 3 p. m. mean is .004 inch lower than his.

It would appear, therefore, from these figures that the records compiled by Messrs. Evelyn, Hancock, and Plageman are quite trustworthy in view of the circumstances under which they were made.

The above remarks by Mr. Alexander, in connection with the data in Table 1, p. 331, MONTHLY WEATHER REVIEW for August, 1900, indicate very clearly a deterioration in the Evelyn barometer at some time subsequent to 1868. The exact time and also the nature of the deterioration can not be determined from the data at hand, but the original records should give us some information on these points.

The following are the averages of Mr. Alexander's readings:

Time.	Mean observed pressure.			W. B.— Hancock.	W. B.— Evelyn.
	Evelyn.	Hancock.	W. B. 274.		
8 a. m.....	29.938	30.005	30.035	+.090	+.097
9 a. m.....	29.968	30.025	30.048	+.023	+.083
10 a. m.....	29.980	30.034	30.054	+.020	+.074
12 noon.....	29.977	30.015	30.031	+.018	+.054
2 p. m.....	29.952	29.980	29.990	+.010	+.038
3 p. m.....	29.985	29.966	29.975	+.009	+.040
4 p. m.....	29.927	29.960	29.973	+.012	+.045

We note at once that both the Evelyn and Hancock barometers, as compared with the Weather Bureau barometer, stood higher during the p. m. than during the a. m. This is what we would expect when we remember that only the Weather Bureau barometer has been corrected for temperature, and the attached thermometers averaged about 5° higher during the p. m. than at 8 a. m.

In the Smithsonian Meteorological and Physical Tables, 1859, is a table of corrections for temperature, to be applied to barometers with glass or wooden scales, from which it is

¹ Not printed in detail.—Ed.

found that a rise of 5° in the temperature should cause a corresponding rise of 0.014 in the mercury in the barometer. As will be seen, the rise in the case of the Hancock barometer is somewhat greater than this, and corresponds to a temperature increase of about 7°.

We must, therefore, conclude that the instrumental correction to the Hancock barometer of +0.016 inch, as determined by Mr. Alexander, is subject to modification on account of temperature effect. When the temperature is low this correction should be increased, and when the temperature is high it should be decreased. This applies to all past records. Apparently at a temperature of about 85° the Hancock and Weather Bureau barometers should read alike after the latter has been corrected for temperature. It might be possible to determine from the series of readings taken in March a more accurate table of corrections for temperature for the Hancock barometer than the one given in the Smithsonian tables; but this has not been attempted.

The Evelyn barometer readings are so discordant among themselves and with the Weather Bureau barometer readings that it is hardly worth while to discuss them. We can only say that there is a large and unknown error in most of the readings since 1868.—H. H. K.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR JUNE.

By Prof. E. B. GARRIOTT, U. S. Weather Bureau.

The following statements are based on average weather conditions for June, as determined by long series of observations. As the weather for any given June does not conform strictly to the average conditions, the statements can not be considered as forecasts.

On the North Atlantic Ocean June is a comparatively quiet month. Along the transatlantic steamer tracks the prevailing winds are from the southwest and severe storms are infrequent. From the Banks of Newfoundland to the American coast fog occurs with winds from the southeast quadrant, and the conditions which favor fog development obtain over some part of this region during fully one-half the days of the month. Icebergs are likely to be encountered over or near the Grand Banks as far south as latitude 40° or 41°.

In the West Indies the hurricane season does not begin until August; the wet season, however, continues from May to October. The typhoon season in the Philippine Islands begins in May.

In the Pacific coast States of the United States the dry season practically begins in June, although July and August are the driest months of the year. In the Plateau region the monthly rainfall approaches the July and August minimum. In Arizona and New Mexico June is a dry month, but it is followed by the two wettest months of the year. In Montana and generally east of the Rocky Mountains the heaviest monthly rainfall of the year usually occurs in June.

Frost is unusual in the United States in June, and when it does occur it is confined to mountain districts and to the northern tier of States.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear